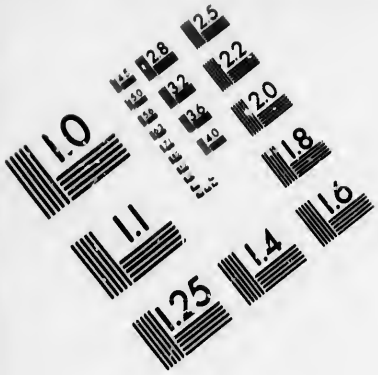

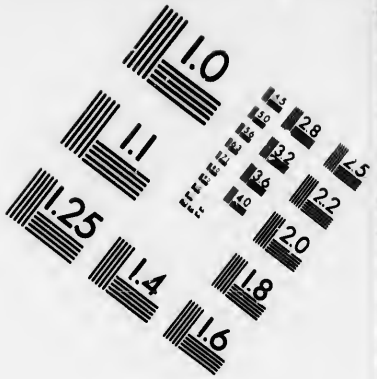

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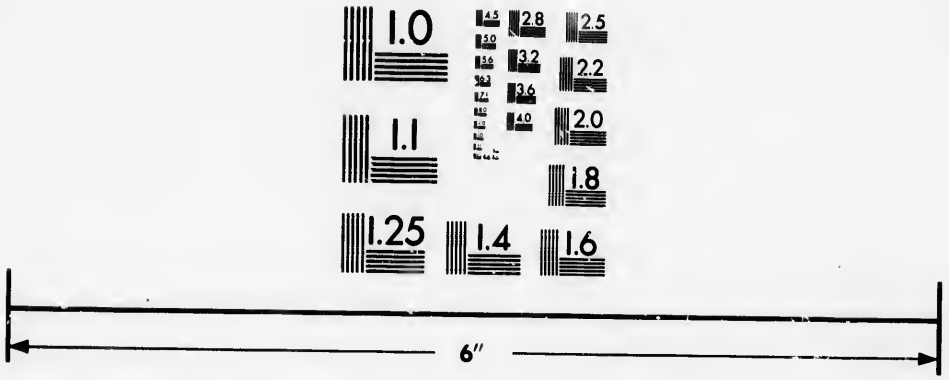

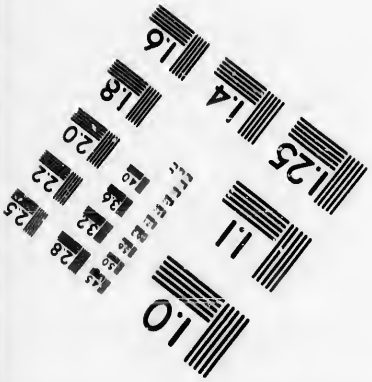

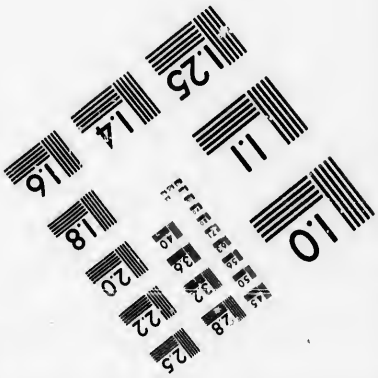

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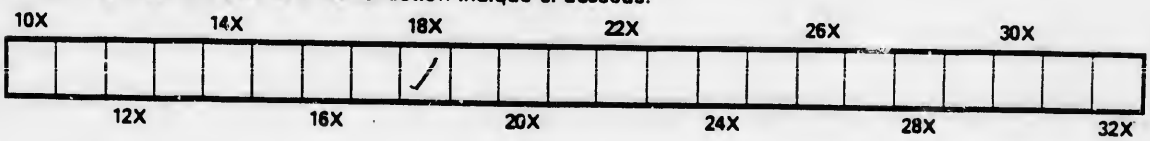

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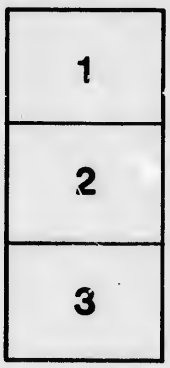

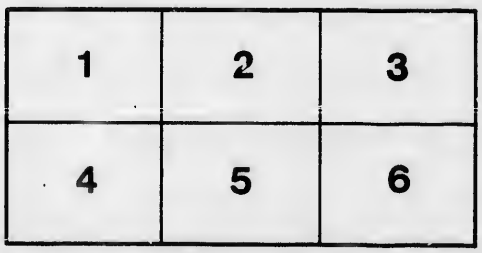

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PLUG REST
DRAINING TROUGH AND BUTTERTRAY
ARCH ALBANY

A BRIEF HISTORY OF DAIRY EDUCATION AT HOME AND ABROAD,

FROM 1832 TO 1892.

By Alexander Holmes.

Middlesbrough:
JORDISON & Co., Ld., PRINTERS AND PUBLISHERS.
1892.

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INTRODUCTION.

At this period when such a wave of Agricultural Education is opening out, it might be interesting to many to read a little as to our movements in this direction during the last sixty years. I have been several times asked why agricultural movements have excited my special interest. I shall explain it thus: I spent the holidays of my early youth on a farm in Derbyshire, and so much interested did I become that I had a great desire to follow the profession, but, being a sort of a delicate boy, my friends thought farming was scarcely a suitable occupation for me. Nevertheless such interest did I take that I got tolerably well instilled into many farming operations and went through the whole process of cheese making. At this farm, situated near the village of Etwall, three miles from Derby, several tons of cheese were made, but only sufficient butter for their own use, the latter I also learnt to make; and from that time to within the last few years there seems to have been but little change in the process; in fact as far as I can remember, —and I am sure many great factors will bear me out that as

far as Derbyshire and Leicestershire makes go,—there seems to have been no great improvement, those two counties having during the last seventy and eighty years, always pitched at their market a very good sample. Gloucester and Somerset stood high also.

We shall all watch with careful interest the extended improvements that will be wrought by this wave of Dairy Instruction which is upon us. There has long been much need for systematic teaching of Agricultural Subjects, both elementary and advanced.

The Author.

DAIRY EDUCATION

AT

HOME AND ABROAD.

CHAPTER I.

EARLY SCIENTIFIC INSTRUCTION.

In 1832 Ireland was pushing to the front a system of Scientific Agricultural Education. In 1836 many schools were established. In these days, among those who were helping in this good work was a Mr. Skilling, who was busy under the Board of Commissioners of Irish Education, he being superintendent of their model farm at Glassnevin, near Dublin, and agricultural teacher in the Normal School there.

Shortly after the institution of the Board of Education in Ireland, notice was given of intention to establish a system of agricultural tuition

in connection with literary education in various schools under their charge. In 1838 they proceeded to rent a farm of fifty-two acres within two miles of Dublin, so as to enable the scholars, who were afterwards to become teachers, to reside at the farm and at the same time pursue their literary education in the city; and under the Board, within six years they had about 300 teachers in the various schools, these were planted in most districts in the country. Their method of tuition was pretty much as follows:—After being engaged on the farm in the morning on fine days, the students went into the town for literary education, the whole of Saturday being devoted to examinations. They had a garden, and in connection with it a competent gardener who lectured one half hour in the morning, and the teacher of agriculture also lectured upon agricultural subjects. At stated periods the teachers attended the farm to witness every practical operation that took place. The students were taught every system of cropping and received instruction in the subjects connected with their studies, including the principle of rotation in cropping—the cultivation of green crops—feeding and soiling of cattle—chemistry and geology. The Board at this time had seven training establishments. They did not, however, rest until they increased that number to twenty, to all of which model farms were attached, where the teachers were

trained for two years, performing themselves all the operations on the farms and, these becoming practical as well as scientific men. The teachers carried away a great deal of knowledge from these establishments. The improved farms did much good in the districts in which they were placed by showing the results of an improved system of cultivation, of which the people previously had no conception, and they consequently soon began to imitate.

At an establishment at Larne, near Carrickfergus, an out-farm of the institution invited Professor Johnson, the Scottish Professor of Agricultural Chemistry, in conjunction with Mr. Gibson, the Inspector of Government Schools, to examine them in the "scientific branches"; and a Mr. Finnie, an eminent Midlothian farmer, and Mr. Alexander, a proprietor of land, to further examine them on "the practical department of agriculture." The students' acquaintance with these subjects was a surprise to all present. They detailed the chemical constitution of the soil and of manures—the effect of manures—the land best fitted for green crops—the different kinds of green crops the best system of rotation and of dairy management—in a way which evidently had not been expected. This shows what may be expected from the training now going on in our midst.

As to the advantage to farmers, Lord Clements reported that on his property, lying in the

wildest part of Connaught, the system of instruction was so popular that men twenty years of age came many miles to attend these schools; and many small farmers, who a few years before could hardly keep one cow, soon managed to keep three or four, and many who before found it difficulty to pay their rents afterwards became comparatively independent.

Mr. Blacker, manager for Lord Gosford, at Market Hill, Armagh, opened a practical school for the tenants of his employer. At Templemoil, near Derry, a practical school on a large scale was at this time self-supporting and had been at work for some time. The Scotch farmers at this time made considerable stir, thinking that they must be in the swim. They were so pleased with their visits to Ireland, and their progress, that, although they had long taught agriculture in their schools, they desired that farming matters should be still further pushed to the front. England, too, was roused a little at this time. A college in Gloucestershire, with a model farm of 400 acres, was talked about, also one in Kent. Mr. Atlee, a teacher at an agricultural school at Ealing, in Middlesex, on the property of Lady Noel Byron was doing good work.

France, Germany, Prussia, Switzerland, Italy, Sweden, and the United States of America, were all striving at this time to instruct their youth in Agricultural Science and practice.

CHAPTER II.

MARVELLOUS IMPROVEMENT IN SWEDEN AS THE RESULT OF INTELLIGENT FARMING.

Gothland was pointed out in 1830 to the emigrant as a field for agricultural enterprise. Some intelligent East Lothian farmers, as a consequence, went out to make personal examination of this island; this led some into Sweden, and there dairy operations were commenced. In 1835 Count Reventlow—son of the eminent Danish statesman, who effected such important agricultural reforms in his own country a hundred years ago,—bought an estate of 11,500 acres in the midst of a wilderness in the south of Sweden, fully thirty miles from the nearest seaport. The soil at this time was described as good, it being clay in some parts mixed with gravel, and in others sandy. But at this time agricultural farming was in a very low state. The arrangements made by Count Reventlow point to the first great step in agricultural improvement in this now thrifty country. In only two hamlets on the estate the tenants

had arable land around their homes, all possessed in common some pasture land, which was more than one Swedish mile (about seven English miles) distant from their hamlets. In a third hamlet similar arrangements were made so as to give each tenant separate arable land around his farmhouse, also separate meadow land for hay-making in another locality. All the tenants joined on the common for pasturage. All the rest of the peasant lands—which formed the greater part of the estate—were held by the tenants in community. Around each hamlet a small field was fenced in and cultivated by the inhabi-habitants in common, each tenant reaping the produce of perhaps from 12 to 16 different and distinct bits of land, each piece often only a few yards wide. Broad tracts led from the hamlets to the common pasturage fields, which were used not only by the tenants of this estate, but likewise by those of several neighbouring estates. These commons or heaths extended over several square miles of uninhabited land and looked like a part of a wild country. In these deserts the cattle were turned out every morning and (only the milking cows were attended to) kept together and in the evening brought home by the herdsmen of the several hamlets. Horses and oxen were only sent for now and then, chiefly when they were required to bring the timber from the woods to the sea coast, the plough being used but sparingly. It was often very difficult to find the animals in

these wide-spread tracts where they wandered about under the oaks and beeches, or were hidden in the brushwood of alders, junipers and other shrubs. It often occurred that a peasant, having for some days sought in vain for his beast in the vicinity of the hamlets, put a bag on his shoulder with a week's provisions and set out into the wilderness in search of the missing animal, which was sometimes found alive, but as often dead, having ventured into some unknown bog. All the land cutlivated by the tenants for their own use in 1845 did not amount to more than 1250 acres, and the three manors had 470 acres under the plough.

As the tenants under this wretched state of things could do little beside raising a scanty subsistence for themselves, the estate was productive of very little to the landlord, indeed the rent consisted solely of a small amount of occasional labour. The chief revenue was derived from the woods, which were not used in an economical way. The moral state of the district was also wretched, there being scarcely such a thing as regular education, whilst all old customs and superstitions were religiously clung to. One of the regulations at this time was that each tenant in a hamlet was bound to sow and reap on the day fixed by the hamlet law, whether the soil or the corn were fit or not; this seemed very absurd, but such had been the use and custom of their fathers and their grandfathers, and

those they said (as we are in these days apt to say) were old and wise people who had experience and knew what ought to be done.

The clothing and food of the people were most miserable. When they, in the summer, were cultivating the fields on the manors they often took with them their scanty provisions of bread, cheese and milk and stayed there the whole week, passing the nights in the barns. Their tools were in accordance with the rest, and their horses little better than ponies.

In taking possession of the estate the problem which the new proprietor might be said to have before him was: how to raise the revenue in proportion to the purchase money? The first reform introduced was to give leases for life to the tenants of those two hamlets in which each farmhouse was surrounded by its own land, stipulating for a certain yearly rent in money; and to give similar leases, but only for five years, to the tenants of the third hamlet where the land to some extent was appropriated to single farmers, but in a way which could not be allowed to continue. With a view to educating them for their future occupation as farmers, all the other peasants were obliged to agree to do a certain amount of labour in the fields of the manors, and to pay some inconsiderable rent in money.

Meanwhile, during the summer, the difficult and delicate task was performed of making out from

old documents and fixing by surveyors the boundaries, first of the whole estate, and secondly of the lands belonging to the several hamlets and manors. The tracts of woodland most fit for real forest culture were at the same time marked out, to be preserved in as regular and compact a manner as possible. Finally the single allotments were marked out to the tenants of the hamlets, so that each farm land was in one complete piece, generally adapted in size to the farmer's skill and means. This was often done by dividing the land of each hamlet into the number of allotments equal to the old number of farmhouses in the hamlet; but some new pasture farms were also formed out of the land. It then became needful to remove many buildings, to build new ones, and to place others on the waste fields. Many settlers soon arrived, settling down on allotments, most of them about 50 acres, many smaller, some not more than six. Draining and clearing then followed and the large blocks of granite that covered the land were removed, and wonderful improvements followed.

The yearly rents that were to be paid in money were lowered for the first years in proportion to the quality of the soil, and to the improvements and breaking of new land stipulated for in the contracts. In some cases the first years were to be free of rent. It was not before the spring of 1846 that the whole might be said to have been arranged in the way described above. At that

time a number of farmers—who had in this manner risen from labourers or servants, holding their places only at the will of the proprietor—in order to hold their land for a longer series of years, made a still further progress by buying their farms, the greater portion of the purchase money to be retained under mortgage for a fixed period, unless the buyer choose to pay the whole earlier.

Within a few years of this time, in this district —where nothing met the eye but moors and bogs, the desolate resort of pewits and snipes, or monotonous fields covered with shrubs and boulder stones in such quantities that one might leap from one to the other—there were smiling cornfields, yielding their rich produce to the cultivator, and the whole landscape enlivened by rich country houses. I merely name these facts to shew the foundation of the progress and improvements made in a few years in the southern part of Sweden, 50 years ago.

It was these wonderful tales in my youthful days that made me interested in agriculture, and I have often wondered if similar changes could not be effected in hapless parts of our own empire. These facts shew what can be done by education.

CHAPTER III.

AMOUNTS EXPENDED BY DIFFERENT COUNTRIES ON SCIENTIFIC AGRICULTURAL EDUCATION.

A good work in the direction of agricultural improvement has been commenced in a large number of local centres under the auspices of County Councils, Agricultural Associations, Clubs and other similar bodies. Much good work is also being done in many elementary schools in rural districts, where the simple principles of agriculture are taught. In this way the children of the agricultural labourer (along with others) may acquire an intelligent interest in the work of the farm in its various departments, and so qualify themselves for becoming more capable servants.

It may be interesting here to dwell upon the importance of turning our attention to this great industry, in which nine-tenths of the capital of all civilised nations is embarked and in which nearly 300,000,000 men expend their daily toils. When a country is thinly populated, a defective system may answer the

wants of the inhabitants; but when the population becomes more dense the same system will not do. As the population increases care must be taken to improve matters. In 1790 the population of Great Britain was about nine millions, in 1890 nearly thirty millions. Now the question comes, are we keeping pace with this increase? Confining ourselves to English Agricultural Education, what have we been expending compared with our neighbours?

Out of £500,000 voted and spent by the Science and Art Department, only some £6,000 was apportioned to Agriculture. Now that the County Councils have taken this question up, we trust it will be trebled. Germany, apart from Prussia, spends £76,000; Belgium, with its five and a half millions £55,000; Denmark with its two millions, £12,000; Sweden with its four and a half millions, £8,000; Ireland with its four millions, about £10,000. Australia has already voted £375,000. England, as I have already shown, up to the time of the County Councils taking it up, stood at the bottom of the scale, and if it now trebles it will stand still very low in the scale in proportion to its population. So that we are greatly to blame for allowing ourselves to be elbowed out by the foreigner, who now, to a large extent, supplies us with dairy produce.

Our payments to other countries are becoming gigantic. They were in 1891, for butter

£10,000 000; margarine £4,000,000; cheese £4,000,000; eggs £4,000,000. We and others paid the Finns in the cold bleak country of Finland £600,000 last year. Now how has this all come about? In the first place you will remember our reference to the wave of Agricultural Education that passed over Ireland from 1832 to 1838. In twenty years from this time their butter was sent over into this country in large quantities. This was followed by a great number of eggs. All those interested in the diary progress in this country will remember the various forms in which butter was sent over here in lumps of irregular size, packed in boxes somewhat similar to our American bacon boxes. Many of these boxes were packed with a variety of makes, collected from small makers, this varying very much in flavour, colour and size. Some were very superior, the best were sold in the Manchester market.

I might here state that each lump was wrapped up in a piece of muslin, these lumps are still being sold but not in such large quantities. That collected from the smaller makers was decidedly of a peaty flavour, owing to the want of proper dairy room it came much in contact with the smoke from the peat fires that are so much used in the rural districts.

But more attention has been given to the *cask* trade. These casks of butter have been sent over here steadily for fifty years and quoted in

our papers every morning, so that a dealer is always posted up in the price of this article by the cwt., consequently tons of it are sold weekly. With its 1,500,000 cows, the butter yielding returns are £6,500,000, and by increased education and improved appliances the returns might easily reach a million more; some think it might be doubled by a great agricultural effort. The old dirty looking cask is now being put to one side, and the nice clean white wood, the same as is used in Denmark, is substituted. When first introduced there was a strike against using them, this has been overcome and they can now hold their own. At the present time they are sending over neatly packed baskets for family use.

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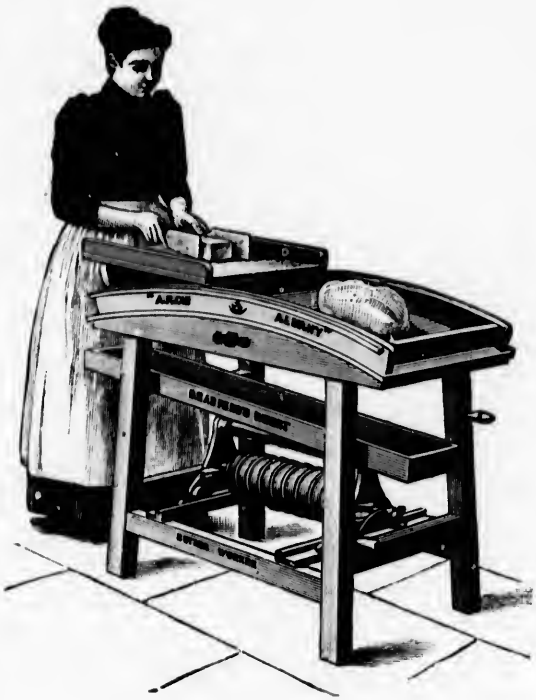

CHAPTER IV.

WHAT DENMARK HAS BEEN DOING.

We will next take Denmark, another of our opponents, and a very strong one she is! She noticed that we were not giving our dairy much attention, so she sent her agents over, 30 years ago, to dwell among us and study our wants. She made this her study for years, not adopting the plan of making her butter to her own liking and then trying to force it upon us, but taking the wiser course of studying our wants. The agents then returning to their countrymen, informed them that we were the largest consumers of butter in the world. They set to work and turned every farm-house into an agricultural study. The co-operative system was found to be the best to cope with the rapid and ever-increasing demand which is going forward in leaps and bounds.

There are 630 of the Co-operative dairies in the country, the majority of which have been called into existence within a few years. I find, on enquiry at headquarters, that in one case there

are 145 partners in one of these factories, each of whom is responsible to the extent of £1 11s. 6d. per cow, entered by him for the supply of milk. In this case the milk of 1,112 cows is sent to the factory *daily*, or rather the horses and carts belonging to some of the partners collect the milk from the whole of the contributors, at the same time delivering the skimmed milk, 80 per cent. of which they get in return at a cost of three farthings per gallon. In some cases more is paid, even as much as 3¼d., but at the end of the season they participate in the profits, which are divided. The majority of these people are in a small way of business, keeping from four to forty cows. Many own their land, others pay from 20s. to 25s. per acre. There are instances in which four-acre farmers manage to keep three cows, each cow getting half a ton of cake and bran per annum in addition to the produce of the land. These Danish farmers seem to be satisfied with the results they obtain, but, as they pay as much for their land as we do in England, and as they receive considerably less for their milk, it may be assumed they are most industrious people. They commence at four o'clock in the morning, the finishing time being best known to themselves. These factories are conducted at small expense.

The Co-operative Dairy Factories have been established on somewhat the same lines.

I. A loan is established, for which all are security, one for all and all for each, in proportion to the number of cows signed for. We will say the loan is intended to be £1,166, the said loan being expected to be paid back in twelve years, and when the loan is paid out, each deliverer of milk will own a share in proportion to the amount delivered. The milk is intended to be procured from those interested, and by buying from others outside the factory.

II. Should anyone that supplies milk wish to withdraw before the expiration of five years he must pay 11s. per cow, and sacrifice all further share in the dairy. Should a supplier of milk wish to withdraw after the lapse of that time, his portion must be paid according as the general meeting decides, his share to be less one-half.

Should a seller of milk die or sell his farm his obligations to deliver milk shall cease, also the duty of the general meeting to settle accounts with the same; but the new owner can enter into the same terms as his predecessor.

Any person can, at any time, secure an interest in the factory by paying an entrance fee (proportionate to the cost of the establishment of the dairy at the time of entering) besides 11s. per cow. He will then become part possessor of the dairy and all connected with it, just as he will be liable constantly for the remaining arrears incurred at the erection of the factory, according to the number of cows.

The suppliers of milk are bound to deliver all they can dispose of, but are allowed to sell in small quantities, or give away, according to their own pleasure. The milk is fetched at the cost of the factory; the carts driving along the high roads. Those living a few fields from the road send it to the nearest high road gate. The milk must be pure, without any disagreeable taste, and paid for according to the amount of butter contained therein. The right consistency being: 1 lb. of butter, 28 lbs. of milk. Thus it follows according to the above agreement, that milk which requires 27 lbs. to make 1 lb. of butter will be paid for with the agreed price, whilst the price on both sides shall fluctuate according to the amount of butter contained in the milk. The skimmed or churned milk shall be returned to the suppliers from three farthings to 3¼d., according to circumstances.

Each supplier must keep his milk cool when not fetched immediately after milking. Two measures of milk must not be mixed together before both are properly cooled. The milking must be done with dry hands. The cow's udder must be carefully wiped, and the milk at once strained; it must not remain standing in the cow sheds. The milking pails must be kept quite clean.

Winter feeding must consist of one pound to three pounds of linseed cake and four pounds of

bran and oats to each cow at *least* twice a day. Biestings must not be delivered the first four days after calving. Milk from sick cows is refused. In the latter case the veterinary surgeon must decide when the milk shall be delivered, and those requiring his services must pay expenses.

The suppliers of milk must supply their own transit cans, the milk being paid for by weight when handed in at the factory. If sour or of bad flavour, as is the case at times, through not keeping the cans perfectly sweet the dairyman has power to reject it.

The highest authority concerning the factory is the general meeting, each Shareholder having a vote without regard to the number of cows. Alteration of rules or dissolving of the society requires two thirds of the votes of the Shareholders. Ordinary general meetings are held half-yearly, when the report and financial statement is read. Any member can introduce special matters for discussion on these occasions by giving notice in writing. Extraordinary meetings can be held as often as is found needful or at the request of twelve Shareholders. Women are allowed to vote when responsible Shareholders.

The directorate is to consist of say six persons who shall select their chairman; lots are drawn every two years, re-electing the retiring portion or any others proposed in their place. Two

auditors and one accountant are elected annually; the three last named need not be Shareholders.

The directors undertake all that is necessary in the careful working of the dairy. Disputes between the deliveries of milk and the dairyman are settled likewise by them.

Paying for milk according to the quantity of cream, which is now introduced into so many dairies, has proved most valuable in rivalry to produce the best milk.

The above is a mere outline of the factory system, they have been wonderfully helped in an educational way. Denmark is simply permeated with schools; the chief college, with its 300 pupils, costing the State £6,900 a year. In fact they owe their entire success in the English market to their complete system of education.

This country is now mapped out with these dairies from one end of the country to the other.

CHAPTER V.

WHAT FRANCE HAS BEEN DOING.

We will now look into France. Normandy and Brittany many years ago sent over to this country to see how London was supplied with butter. They found the supply very unsatisfactory, and but little attempt being made by our countrymen to look it up. They then sent agents over to make it their study, which ended in a determination to prepare to supply this city. They obtained samples from the various hotels and restaurants, sent them over to Normandy and Brittany to be matched. The information soon spread among the peasantry, and a sort of rivalry sprang up to match one against the other. The news then went forth that to be successful they must be uniform in their make ; markets or centres for their produce, that had been used for a long period of time, soon began to change in their character, the order of the day being lump butter fresh from the churn, with very little salt, if any. The American visitor to London calls this butter tasteless.

Each market town has one market day a week, so arranged as to allow two days between it and the market day of any adjoining towns; these towns being near enough to each other to allow most of the farmers to reach two or three markets each week.

Churning days and market days are the same, everything is so arranged that the churning is done in the early morning, generally 4 a.m. The butter is then brought to the market not only fresh from the churn, but absolutely unsalted; the one great care taken is to keep it cool. There are a considerable number of butter merchants that attend each of the markets. Thus the same set of producers meet the same set of buyers, two or three times a week. This system results in an extensive trade, lively markets, and stiff competition. The early trains bring in the buyers, and the one horse carts bring in the country people, with their newly churned butter in baskets. tubs or pails well wrapped up in damp cloths.

Each butter merchant is provided with a number of large baskets and cloths, a weighing scale, a table or desk, a cash-box, and a book of tables for rapid calculations. The buyer receives, weighs, and prices; also pays for the butter and throws it into the huge baskets, ranged side by side, to be filled with the different grades of quality. This is all done in a most rapid manner.

The mystery as to how this is valued in price to a fraction is thus explained. Each merchant has one or more buyers moving about the market among the peasants, examining and bargaining for the butter, and marking on the butter itself the price per pound agreed upon. The butter is practically sold before it is brought to the merchant or his receiving clerk, who has only to weigh it and pay the agreed price. Some of the larger merchants are assisted by one or more clerks, who record the sale and pay for the butter, all being kept busy for two or three hours, until the butter is all sold and bought.

What a delightful sight it would be to see our various markets thus swept of its supply! I hope the day may be near when we shall be inspired with feelings of admiration for such a busy scene.

The receiver quickly turns the butter out of the scale, tosses the empty basket and cloth back to its owner, weighs the lump or lumps, calls out the weight (so may pounds at, say 1s. 2d), and then begins with the next. The clerk, reckoning it up, makes an entry of the purchase, counts out the amount, in gold, silver and copper, and he is then ready for the next weighing. Consistency, solidity, odour, are the quantities taken into consideration.

The baskets in which the merchant then packs his butter are about two feet high, eighteen

inches across the top, and fifteen inches across the bottom. Two large sheets are provided for each basket, wrung out in cold water and laid inside the basket so as to thoroughly envelope the butter. Straw is laid at the top of the cloth and the whole tied down, the basket marked to indicate the quality or grade, then addressed, loaded immediately on carts, taken to the railway station, and conveyed to the head-quarters of the butter merchant, or in other words, to the packing or blending warehouse, thence by steamer to London, ready for delivery the next morning.

As an example of the blending houses, Bretel's factory at Valognes send sixteen tons of butter to England daily. This firm employs twenty-five buyers whose business it is to attend to markets. The purchases are divided into four grades or qualities as much as 1/2½ per pound being paid. No salt is used in the best quality, and this butter keeps well. The quantity dispatched, varies from 308,000 to 430,000 lbs. per week. The lumps of butter as they are mixed up on the blending table are coloured with annatto to ensure uniformity of colour. This blending system seems the best for the London market and its success points to the great good resulting from 20 years' hard study to secure the market of this great city.

A few particulars may be interesting as to the make of fancy cheese such as Brie, Camem-

bert, Gorgonzola, Roquefort, etc. ; all of which have a great sale in this country. In the Calvedos district there are three farmers who are sending 6,000 Camembert into England daily, who have their own French agents in London who do nothing else but sell their cheese. What an industry this would be for many a Yorkshire village ?

This French system of agriculture has been a wonderful assistance to them. They have four colleges, ten high schools, twenty-four farm schools, twenty-five agricultural stations, and upwards of fifty professors who are engaged in various departments. At the colleges they pay about £48 a year, the balance of £70 being paid by the Government. These colleges are somewhat similar to our Royal Agricultural College. The principal institute at Paris costs £10,000 a year, the intermediate schools £23,000. The departmental professors cost the Government £7,000 and the agricultural stations £4,000, so that you will see that horticulture, shepherding, dairying, forestry and all other departments of agriculture are well looked after. The French also give important prizes for the cultivation of farms.

I here introduce a cheese largely used in Paris, Gerome Cheese. It would be difficult to find anything made from cow's milk more delicious than this cheese, more particularly just as it begins to get ripe.

This cheese varies from 5 to 7 lbs. in weight, soft, and round in shape, and sometimes made with the addition of aniseed.

This cheese is made with milk at a temperature at which it comes from the cow—say 95 degrees. This is placed in a deep vat holding some 50 quarts, where it is covered with a lid, in the centre of which is placed a wooden funnel in the form of a cup. To the bottom of this is attached a cloth for the purpose of straining.

The rennet is added in quantity according to the condition of the atmosphere, in half-an-hour the whey is divided from the curd. In another half-hour the separation is continued with the aid of a copper strainer.

When the curd is divided into pieces about the size of a small nut, it is taken out and placed in wooden cylindrical moulds from six to ten inches in diameter. Two moulds are used for each cheese, the one being fixed into the other, which is somewhat larger in diameter, and has a number of holes pierced in the bottom. The total height of the two when fixed is from 13 to 15 inches. The curd entirely drains in this mould, and at the end of about twelve hours it will have sunk to about the height of the bottom and larger part of it, so that the top part can be taken off. The cheese is then placed in a mould of the same diameter as the bottom one, and put upon the shelf upside down. After seven hours it is again turned, and this turning is continued twice daily for two or three days.

In draining the whey, the moulds are placed upon sloping shelves which are furnished with a pin at the edge, as in Norway. The whey runs off and is caught below in vessels for the purpose. The temperature of the room in which this process takes place is carefully kept from 58 to 65 degrees. The next operation is the salting. The cheese are placed upon boards on which layers of fine salt are sprinkled.

The surface of the cheese is well salted and this operation is repeated day after day, care being taken to turn them each time. This turning is continued twice each day for three days after salting, and the surface of the cheese each time well moistened with tepid water, when the crust becomes dry they are removed to the drying room, in this room the cheese shelves are built one above another to economise space, they are here thoroughly dried.

In summer the ripening is often done, partly in the open air, the cheese being protected with cloths to keep off the sun and flies.

They are finally removed to caves or cellars where they are very carefully watched, in these caves, or cellars, there must be a good draught through, and at the same time the temperature carefully watched, for in case the temperature becomes too low the cheese cracks and looses quality. The time they remain here is determined by the season and size of the cheese.

CHAPTER VI.

SWEDEN.

We will now have a few words on Sweden. In 1850 the Government appointed two travelling dairy teachers paying them at the rate of £200 a year giving them free tickets and 6/- per day when travelling about. The plan they adopted is somewhat different from our opening out of travelling dairy work. If anyone was desirous of improving their dairy education, the teacher went to their farm and stayed as long as he was wanted in order to instruct the willing pupil in butter making or cheese making and at the same time teach him how to feed the cattle so as to produce the largest quantity of rich milk and the best butter.

Two Royal Colleges were started in 1883 at Alnarp and Ultuna, being dairy colleges for either in or out students. The fees for the in-students are £40 a year, a variety of arrangements being made for out-door students either by the week or month. They are taught at these colleges the system of dairy farming, Swedish and foreign; dairy pasturage, the selection of grasses, dairy stock, milk and cream,

butter, cheese, the use of implements and machinery and all other departments of agricultural education.

The Government pays every year 33 girls 8/6 each for learning butter and cheese making in good dairy farms. The Government travelling teacher inspects these farms two or three times in the year. In Sweden women always do the milking, and one usually milks from ten to seventeen cows. The times of milking are 4 a.m. and 4 p.m. The farmer must instruct the girls in dairy management, arithmetic, writing, spelling, reading, book-keeping for dairy purposes, and management of the steam-engine, separators, etc. For his teaching he receives £5 10s. from each girl. The girls lodge and board at the farm, and pay the farmer with their work in the dairy. The farms where these girls learn dairy management are situated in different parts of the middle and south of Sweden. We must remember that the length of Sweden is 1,000 miles. The whole sum devoted by the Government for dairy purposes in Sweden will be about £2,200 every year. They also have twenty-eight agricultural associations, and each of these have a travelling teacher of the same kind as the Government teachers, and they are constantly travelling about. These teachers are paid from the Associations, which in Sweden, are giving out for dairy purposes a yearly sum of £5,300.

CHAPTER VII.

GERMANY AND FINLAND.

With this brief account of the doings in Sweden, we will now touch upon *Germany* where there are thirteen principal colleges which are attended by a great number of pupils. The chief college at Berlin costs the Government £126,000 without the land belonging to it and receives a grant of £800 a year; the staff of teachers numbers fifty-one, eleven of whom are professors of considerable eminence, the other Colleges, receive grants of from £3,000 to £5,000 a year and are, in some instances connected with universities. Dairy farms are a special branch of the work at the Royal School of Berlin. There are sixteen intermediate schools receiving grants from the Government of from £750 to £1,250. These schools average over one hundred pupils each. There are thirty-three farm schools which receive annual grants between them of about £17,000 a year; £7,000 of which comes from the State. The number of pupils is in many instances very high. In most cases land is

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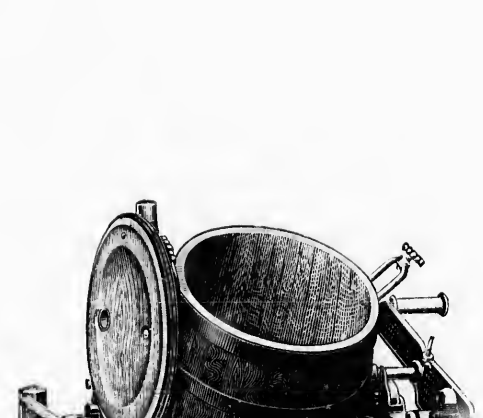
STOP BOLT
T. B. & Co.
BRADFORDS "DIAPHRAGM" CHURN

attached, upon which practical instruction is regularly given. There are also in Germany a large number of winter schools and travelling lecturers. Eighteen special dairy schools have been established, together with schools of draining and irrigation, forestry and gardening. One hundred and fifty chemists and botanists are engaged at the various stations solely in the interest of the farmer.

We will now go as far north as Finland, a cold bleak country with a population of 2,500,000. It being found that cereals are becoming more and more unremunerative, more attention is being paid to dairy farming and a great improvement in quality is the result. There is one very large factory at Hango, in the country, for making butter to forward to the tropics. The proprietors of this factory has arranged with the Railway Company to have stores of ice at various railway stations; and other great movements are on foot in this country for the packing of butter in small tins for the Chinese market. We and others paid the Fins £600,000 for butter last year.

CHAPTER VIII.

DAIRYING IN NEW ZEALAND.

Next we will travel to New Zealand and see what they are doing there. I cannot do better than enlarge upon a few notes received from my correspondent there. With a view to the encouragement of the formation of similar associations throughout Otago, and other parts of New Zealand, there has been an association formed, named the Pioneer Butter Company of Otago Peninsular, whose operations during the past three years have attracted considerable attention and favourable notice, they have leased for seven years some premises that had been working for some time on rather different lines. These premises are now filled up for packing—for export—the surplus summer butter of the shareholders. It may be interesting to quote a few of its articles or rules. The shares are £1 10s. each : one share only to each person, so as to interest the greater number.

Article viii run thus : That the committee of this company be empowered to sell the butter here, or export it to England or elsewhere, as they may deem best to the interests of the subscribers.

Article ix.—That all moneys be divided equally as they come to hand, in proportion to the amount of produce of the different subscribers, after the proper proportion of expenses are deducted.

Article x.—If, during any season, the committee are compelled to export the season's make to the English market or elsewhere, so that at least four months will elapse before any returns can be expected, to those who require it the committee will negotiate for an advance to the extent of 3d. or 4d. per pound on first class butter; and the party or parties to whom such advance is made, to pay the interest and all expenses on the same.

Article xi.—That all butter received by this company must be in the premises on the Tuesday and Friday mornings, respectively, of each week, between the hours of 7.30 a.m. and 8.30 a.m., and it must be churned the previous afternoon or night.

Article xii.—That no butter be made for this company from the milk of any cow until 14 days after she has calved.

Article xiii.—That for the purpose of making butter for this company, the cream must not remain on the milk, in ordinary weather, more than 36 hours, and in hot weather, not more 24 hours before creaming; and no cream to be kept after creaming more than four days before churning; also to be in the cream dish and well mixed at least twelve hours before churning.

Article xiv.—That all butter received by this company must be brought in the granulated form. After it is churned and washed in this form it is to be lifted on to a sheet of butter muslin and spread thinly on it to drain, the sheet of butter to be stretched across a grating or sheet of corrugated iron to facilitate the draining.

Article xv.—That the whole committee be appointed inspectors to inspect all butter received by the company, and that at least three of them be in attendance every time butter is received. The packer to assist; but in all cases the inspectors to be responsible for all the decisions, and any sample of butter found defective will be salted and sold at the owner's risk, or returned to him at his option. All butter received by this company must be without salt and of good quality, free from milk, water, or any other impurity.

Article xvi.—That for the purpose of enabling the committee to make the necessary arrangements for packing, all persons sending butter to this company are required to furnish a statement of the quantity they are able to supply during the season as nearly as possible; and any person, at any time during the season wishing to send more, to give notice of his intention to do so the week before, to the packer, at the packing house.

Article xvii.—All persons sending butter to this company, are required to find their own

pass-book, and to bring it to the packing house every time they bring butter, when the packer will enter the amount, and in the event of any dispute arising from neglect of this rule, the books of the company shall be conclusive.

Article xviii.—All persons bringing butter to this company will, in the management of their cattle, wash and clean the udders of their cows every time they milk, and all vessels in use in their dairy. Buckets, milk-dishes, and other implements are to be properly washed and scalded every time they are used, and every other matter in connection with the dairy is to be conducted so that everything about the premises may be clean and sweet, and in the event of any defect arising in the butter of any person or persons, the inspectors will point it out to them, and also the way which, in their opinion, would remedy it.

Article xix.—That all questions as to the manner of conducting this business, and all and every matter of interest of whatever thing or nature to the association, shall always, in case of dispute, be decided by a majority of subscribers.

Article xx.—The foregoing rules or any of them, may be repealed, amended, or new ones added to them by a majority of subscribers at any meeting called for that purpose.

This factory and other associated cow-keepers, are sending large quantities of good rich butter into this country.

Arrangements are now made in New Zealand that the youth who aspires to the profession of agriculture, but who has not been born in it, may at a moderate cost secure a refreshing insight, both practical and scientific, into the mysteries of his future work. Such a student has everything to gain and to learn and nothing to lose. In this respect he materially differs from the farmer's son, whose attendance at a practical training college is preceded by a sacrifice of a certain amount of manual work which he could do for his father at home, a matter of special importance in the colonies, where the wages of labour are high, and suitable hands often difficult to secure.

Both the New South Wales and Victorian Governments have placed the subject of agricultural instruction and improvement in the foreground of the measures to be dealt with in the immediate future; and in Victoria quite a marvellous amount of money has already been provided for the special purpose.

Twenty-five thousand acres of excellent land have been set apart for the maintenance of agricultural education. The annual income from this source is £10,000, but it is now arranged to fall nothing short of £50,000 a year. In addition to this it is proposed to spend a quarter of a million sterling during five years, in sums of £50,000 a year, in support of agri-

cultural industries in one shape or form. Another sum of £25,000 is to be devoted to the establishment of agricultural schools and colleges, during the current year, and a third vote of £303,000 for the present need.

CHAPTER IX.

AMERICAN DAIRYING.

We must now cross over to America, the country that we first taught to make cheese and from whom our Scotch neighbours have learnt so much of late years.

The state of New York lays itself out for dairy produce. The annual value of its products is upwards of £14,000,000. Their abundance of spring water and their large area of natural meadow-land is all in their favour. The Hudson River counties were noted for the excellence of their butter, but of late years the demand for cream and milk in New York and other cities as well as for condensing factories has been so great that butter making has almost been discontinued.

The area of New York State is 48,000 square miles; while in England the area is 51,000.

The land in cultivation in New York State is 27,000,000 acres; in England 32,000,000. The number of cows within three or four thousand

of each other, England having the greater number. Nine tenths of the cheese made in this state are the produce of factories. The total number of pounds being made is over 136,000,000.

The Lynn Brook Factory, which is situated in a very rich valley abounding with good water and good pasturage, is noted for its cheese. This factory is supplied by three hundred and seventeen cows, owned by practical farmers of means and enterprise. These cows are Ayrshires, Shorthorns, Alderneys, with some Holstein, Devons, and Jerseys. It is stated that from this district the breed producing the *largest* amount of milk per head, is the Shorthorn of pure blood, and that giving the *smallest*, the Devon.

In the St. Lawrence and Jefferson counties, bordering on the St. Lawrence, imitation Gorgonzola and Neusehatel Cheese are made in some of the factories. It takes about one hundred pounds of milk to make twelve pounds of Gorgonzola. In Ontario there are 770 factories, supported by 41,000 dairy farmers, and receiving the milk of 263,000 cows or thereabouts. That is more than one-third of all the milk cows in Ontario. In addition to these factories there are a large number of creameries, in which butter only is made. The 750,000 cows in Ontario are divided into three lots :— One for cheese, one for butter, the other third

for the rearing of calves, so that it will be observed that all the cheese in Ontario is made in factories.

Although American butter does not at present form an important section of the dairy imports of the United Kingdom, about 45 per cent. of the receipts of foreign cheese come from the United States.

It might be interesting here to quote the quantity of butter and cheese received from America sixty-five years ago. More butter than cheese was exported from the United States. Since 1843 these positions have been reversed. For the past twenty years the aggregate export of cheese has been from four to six times that of butter. This extraordinary increase of the cheese exported to us is due to the rise and development of the cheese factory system. The following figures will shew the amounts received since 1851 :—

	BUTTER, LBS.	CHEESE, LBS.
1851–60—	36,300,000	- 78,500,000
1861–70—	133,900,000	- 446,500,000
1871–80—	154,400,000	- 999,900,000
1881–90—	188,200,000	- 1,041,600,000

We are often met with the remark that butter continues to come down in price. If we go back to 1850 and 1851, our fresh country butter was sold in our markets at 8d. per pound. Some years later it reached high prices. In good times, 1860 and 61, it was 1s. 6d. per

pound and more, of late years it has been again reduced. Some think this is due to the competition of butter substitutes, so called. Some idea of the flourishing condition of this trade is furnished by the fact that in six years, from 1884 to 1889, the United States exported an annual average of nearly 400,000,000 pounds of oleo margarine oil and only 2,000,000 pounds of butter, while in 1890 the aggregate rose to 70,000,000 pounds, or more than all the exports of butter for the last four years.

CHAPTER X.

SWITZERLAND.

Before closing our notice on foreign dairy work we must touch upon Switzerland. I think it is beyond a doubt that the Swiss were the first to adopt the factory system or co-operative cheese-making. They date back as far as 1840, and anyone visiting the village of Cham, on Lake Zag, would see, a few yards from the Anglo-swiss Condensed Milk Company, a large cheese factory, now a part of the premises of this Company, built more than thirty years ago by a combination of farmers of that community. The Americans dispute their being first, claiming that, in 1840, a small company owning thirty cows, belonging to seven partners, was the first factory. This was said to be at Wisconsin, so that, perhaps, the fairest way of putting it is that they were started very much about the same time.

The Swiss again claim that a colony from their own country was the first to build a factory in the State of Illinois. There is one thing certain, *i.e.*, that both countries have been

in full swing in the factory system for the last thirty years. A few words on the condensed milk manufacture, in which the Swiss have been so successful, may be interesting here. This great industry is a most important one and many prefer bringing up an infant on condensed milk to that fresh from the cow. It must be safer in many ways. It is a most useful and convenient article, as it can travel round the world without injury.

We are told that ordinary milk contains 13 per cent. of fat and 87 of water, whereas condensed milk contains 77·56 per cent. of solids and 22·56 per cent. of water. Thus it will be seen that condensed milk contains nearly six times the percentage of solids possessed by ordinary cow's milk, whilst the care and skill necessary to its preparation renders it far more pure and uniform in quality than the contents of ordinary milk. In connection with this manufacture, I might here state a few particulars. The milk is brought to the factory by the carts of the Company, where, on arrival, it is carefully tested for temperature and quality. Samples are taken of each lot on delivery and carefully examined to see that the standards necessary for good condensed milk are regularly maintained. The milk is first of all heated in ten-gallon vessels, and when the desired temperature is attained, cane sugar is added to enable the constituent elements of the milk to resist

decomposition, and thus complete its preservation. From these vessels the fluid is passed through strainers and then pumped into a huge copper vacuum pan, here it is kept agitating at a great heat. The water in the milk is pumped off in steam which, passing through cooling tubes, presently issues in a stream into tanks below. The thick semi-liquid obtained is conveyed by pipes into other vessels which are placed in a large tank of cold water, where, by means of mechanical steam appliance, they are kept constantly stirred until cool, when the vessels are taken by lifts to an upper floor and the milk emptied into large tins, at which women are seated, who draw off the condensed liquid into the tin packages with which you are all so familiar, and thus it is sent to all parts of the world.

Before passing Switzerland over it might be interesting to describe the make of one of their best cheese Gruyere, which is manufactured in the mountains of Switzerland. We find a primitive population, who live in a most primitive condition. Farming conducted on a system of many hundred years ago, but every inch of these districts is cultivated carefully and made to yield to the utmost. So steep are some of the fields you would think it impossible to walk up them, and for a horse to plough these seems absurd. They even work some of these fields by means of fastening a stout pulley and

a long rope, run through the block fastened to the plough. Manures are hauled up in the same way. These hardy mountaineers have many other ingenious methods of tilling the soil in this country. Some of the finest cheese in the world is made by these hard working farmers. The pastures among the highlands are unexcelled by any in the world, and among the rocks and ravines the herbage and grass grow in luxuriant masses.

North of the Bernese Alps is a group of mountains known as Emmenthal, and in and about this range are the finest cheese made. These cheese are made into three qualities, cream cheese, half-cream, and skim. The cheese are the Gruyere, named after the small village in the canton of Berne.

The dairies are situated in the caves of the mountains, where cool storage room can be found. These dairy caves are so well adapted to the preservation of cheese that many of the finest ones are kept there for three or four years improving all the time. These cheese are made with the poorest and simplest of tools. The skimmed milk is poured into a large kettle which is hung over the hearth hollowed out in the floor. The night and morning milk are mixed and heated to a temperature of 85 degrees. The rennit is then added and the curd brought in 15 minutes. This curd is cut into

one inch squares with a knife and when separated from the whey it is heated to from 95 to 100 degrees. The curd is cut over again and part of the whey dripped off and the curd is cooked until it becomes stiff and squeaky, when it has reached this stage it is gathered into balls by hand and pressed into the moulds. When pressed into the moulds it is weighted down by stones, in about thirteen hours it is so pressed it cannot shrink any more. The moulds are turned daily and the cheese salted on both sides until it will take no more.

The cheese is then taken away from the moulds and placed away on the shelves of the cold caves where it is finally cured by the peculiar fermentation which forms the eyes in the cheese. Gas is formed in the cheese during this period, and it makes holes all through the mass which are always to be found in the true Gruyere cheese.

While being thus cured in the caves, the cheese have to be turned, scraped, and washed with salt water every day or two, this operation is kept up for nearly a month The most perfect cheese are those which are soft and melting in the mouth, and perforated with holes almost an inch in diameter. The interior of this cave is simplicity itself; the fittings consist of a few benches, tubs, wooden tables, strainers and wooden stirrers and a fire place over which the heater is hung.

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SLATE TABLING
BUTTER WORKER
DAIRY
TABLE
OPEN DRAIN
CHURN
WARMER
SEPARATOR
FRESH MILK TANK
SEPARATED MILK TANK
PUMP
ELEVATOR
REFRIGERATOR
S
C
B
Y
COAL
SHOOT COALS OVER
ENGINE & BOILER HOUSE
ENGINE
BOILER
SKYLIGHTS
DRAINER
WASHING TABLE
BENCH
STEAMING
Z
CHAFF CUTTER
FODDER ROOM
X

The milk stool used is most unique. It has one leg only with a sharp iron point on the lower end which goes into the ground when standing, and the said stool is strapped around the milkers body, so that it is always with him. Each milker has 15 cows which he milks night and morning and watches in the daytime.

These cheese, the Gruyere, vary from 29 to 34 inches in diameter.

CHAPTER XI.

SUGGESTIONS.

We have now touched upon what our opponents are doing and somewhat how they do it. We are paying these countries spoken of:—

£10 000,000 for Butter
£4,000,000 for Margarine
£4,000,000 for Cheese
£4,000,000 for Eggs

Should we not reduce this, or at any rate somewhat stem the rapid way in which the quantity is increasing? The great question before us is —is it worth it?

This foreign supply is by no means creditable to us, who have better land and cattle and can, if we set to work, produce the best butter in the world, as some of our butter exhibitions have proved. Many of our opponents labour under great disadvantages; Sweden and Denmark have very much more severe seasons than we have. The root of the matter is that foreign farmers have availed themselves much more quickly of the improved methods than we have, and in this

way they have been able to turn out a uniformly high standard and thus this has given them the hold of our markets, which they at present possess. Therefore by taking a leaf out of their book, let us go into all the systems named *i.e.*— the Blending House, the Factory, the Creamery, and Private Dairies, and consider carefully as to their suitability as to any reform we may enter upon.

The butter factory system, whether it be proprietary or co-operative, is one in which milk producers send their milk to the factory for conversion into butter, and frequently into cream or soft cheese in addition; by this means uniformity is obtained, the milks all being mixed. Thus we overcome the difficulty, of every dairy-maid at the various farms making butter after her own fashion and all with different ideas of feeding, etc. Then again if we compare the factory made butter with that of private makers in butter competitions, we shall find the latter to the front. I need not here again dwell on the factory system, having explained it elsewhere.

Some are of opinion that the above named system is more adapted to those districts where the population is small and scattered, where land is cheap and where railway communication is difficult. Then again many think that the Factory would be of little use unless situated close to the main line, so that the produce could be speedily forwarded to large centres.

I am inclined to think that if the factory or blending house became general, the consideration would be to so map out certain districts that the receiving house would be within convenient distance for delivery, and collection. Most in that district, being interested in the welfare of its success, would arrange among themselves to deliver when ready to the main line, even if some distance. This would apply to many of our dales which are almost exclusively grazing land. It would lead to those districts, which are even now considered by many the most suitable for cheese and butter making, at last giving their time to the study of producing the best article. The occupiers of land would keep cows to the full power of their holdings, but they would not do the dairy work at home if sending their milk to the factory.

On the other hand the factory staff are wholly occupied in separating the milk, ripening and churning the cream and making up the butter. They having nothing to do with the care of stock, nothing to interfere with the steady uniform discharge of their task as butter makers, thus become exceedingly expert, and the labour expended upon each pound becomes proportionately less. This brings two advantages;—the butter is produced cheaply, and it is always of one quality.

The natural result would be one factory vieing with its neighbour as to who could produce the

finest butter that would keep a reasonable time. The latter is a most important item and one that has enabled the Irish, Danes, and other makers to defy us in supplying the increasing numbers that reside in passenger steamers, either on business or pleasure, for our American and Australian steamers continuously sailing from our ports with 600 passengers on board require each about 2,000 pounds of butter, and all small steamers leaving every hour of the day want smaller quantities. This trade is a very considerable one, but our present arrangements debar them touching English butter, ours being the only butter in the world not quoted daily in the papers by the cwt. In this respect some of our opponents are 50 years ahead of us. This brings us to the point of having besides our perfectly fresh butter, some so made that it is as good on the arrival of the steamer at New Zealand as it was when it started.

CHAPTER XII.

CREAMERY AT DUNRAGIT.

But the question is; what are we doing to bring about these reforms? There are in the country at the present time several factories—what work have these done? It might be interesting to speak of one at Dunragit in Wigtownshire, in the midst of the finest dairy district in Scotland, where large herds of Ayrshire cows are kept, many of the farmers keeping from 80 to 150 cows, the milk of which goes to the Creameries. The climate is all that could be desired for dairy operations, this South West corner of Scotland being destitute as far as we yet know of minerals, and has not been cut up by mining operations, nor are they troubled with volumes of smoke and noxious fumes to pollute the atmosphere.

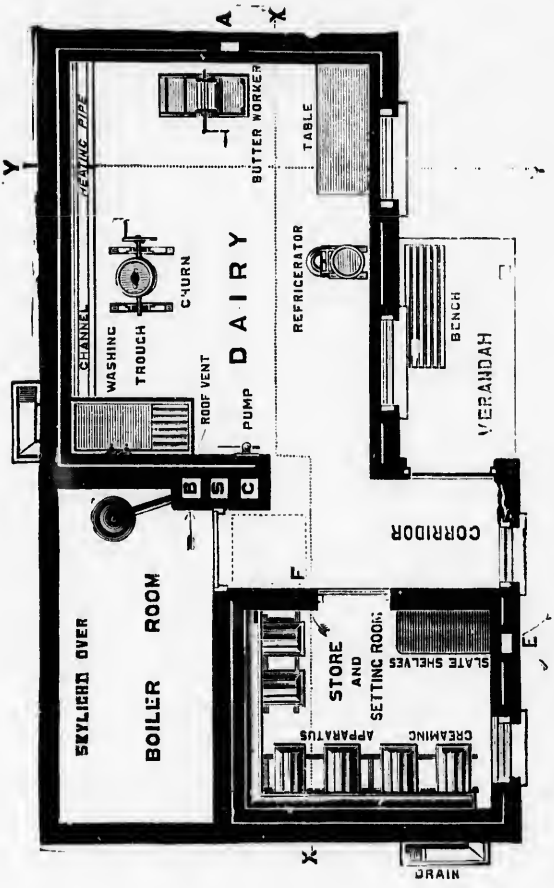
The premises that I am about to describe were commenced as a private enterprise by Mr. Andrew Clement of Glasgow, and Mr. Robt. McCracken a Wigtownshire farmer in the year

1882, and has since been formed into a joint stock company under the title of the Creamery Co. (Limited), amalgamating itself with the Valleyfield Dairy Co., (Limited) in Kirkudbrightshire, and is now the most extensive undertaking of this kind in Great Britain. At the entrance to the Creamery are the handsomely appointed offices, from which the visitor is introduced to the receiving department, where the milk, supplied by the farmers in the locality, is received and weighed. The entrance to this department is besieged every morning for three hours by an array of farmers' carts and spring vans, which deliver a quantity of milk varying from 3,500 to 4,500 gallons daily. A large number of samples are tested every day, and every precaution is taken to preserve its purity. Farmers supplying milk are prohibited from using foods known to be injurious to the quality and flavour of the produce, and the company reserve the right to inspect the farm premises, and to see that proper sanitary conditions are maintained. Consequently all the milk that passes into the factory is pure and of good quality. From the weighing machines the milk then passes to the vat room, where it is stored in large vats of the capacity of 800 gallons each ; from these it is conveyed by means of tin lined pipes to the warmers, and thence to the centrifugal cream separators, of which they have five, from which the milk and cream when separated flow to their

respective reception vats to wait the next process. Part of the cream is made exceptionally thick, and after being very thoroughly chilled, is put up into neat little earthenware jars, carefully sealed and despatched to the cities every afternoon.

This cream, which keeps sweet for at least fourteen days, is highly appreciated for table use by many city people. The rest of the cream remains in the vats until sufficiently ripe for churning. The churns are two in number; the larger one is of the ordinary Scotch pattern holding 300 gallons; while the smaller square ton churn is kept in reserve in case of accident. After being removed from the churn the butter is taken to the "making up" department, which is supplied with a marble revolving table, which is driven by steam power. The butter which is kept perfectly fresh, is, after being weighed, passed on to the pressing room, where it is pressed into round and square patterns to suit various markets, and packed into large boxes fitted with shelves, which are sent to Glasgow and Edinburgh, in time for evening delivery to consumers, whilst that sent to the English towns is in good time for early morning.

During the summer, when there is little demand for separated milk, cheese is made, which is one of the specialities of the Company and for which there is always a good demand. The cheese-making room is supplied with three large double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SKYLIGHT OVER
BOILER ROOM
STORE AND SETTING ROOM
SLATE SHELVES
CREAMING APPARATUS
X
DRAIN

cased rectangular vats capable of holding 600 gallons, filled with cold water and steam for controlling the temperature during the delicate process of cheese-making. Rennet is used for the coagulating, after which it is cut into small cubes and carefully stirred to allow the whey to escape. After the curd is sufficiently consolidated, it is torn to pieces by a curd mill, salted, and carried to the press room, where the cheese are pressed horizontally in "gang presses", to expel the remaining moisture, after which they are taken upstairs to the curing room, where they are placed on shelves and turned daily. This room has sufficient space for 1,500 cheese. There they remain for about a month, the temperature being kept regularly at about 70° F. The whey and butter milk are used for feeding pigs, of which about 300 are kept some distance from the factory.

In addition to butter and cheese making, the margarine department is a very important one. This is made very differently from the American style, which I will touch upon hereafter. An abundant supply of spring water is provided and this is further chilled by means of freezing machines. One of these machines has a cooling capacity equal to 8 tons of ice per day. This department is entered by the store on the upper floor, where are piled up casks of raw material, (oleo-margarine) which consists of good beef fat partly of home production and partly from the

large slaughtering establishments of Chicago. From the store the oleo passes to the melting room, where the various fats are melted and prepared for churning. From this department it descends to the churns situated at the lower level, where it is carefully churned with new milk and blended with good butter, and then run out into large tanks of cold spring water, which have been previously chilled by means of the freezing machines alluded to above. From the churn room it is passed in trucks containing 7 or 8 cwt. to the working room, where it is salted and worked between powerful fluted rollers and prepared for the packing department. Here we find a lot of men busy at work weighing and packing up the finished blends and margarines, in a great variety of packages of all shapes and sizes, from half pound prints to hundredweight casks. A large quantity is packed in hermetically sealed tins, for export to foreign countries and for ship store use.

The extent of the margarine plant may be imagined, when it is noted that it produces about 160 tons per week.

This Company has another factory at Tariff not quite so extensive as Dunragit. The quantity of milk handled by the Tariff factory is 3,000 gallons daily, and the margarine 100 tons per week. This Company now has an officer at Glasgow, London, Liverpool, Manchester and Newcastle, with agents in continual touch with the public.

After describing my visit to these factories, it might be interesting to know what has been going on in other parts of Scotland, of late years, in the way of dairy reform and the result of the great pains taken in that direction for several years. They have done their best to encourage the establishing of Dairy Schools, for learning both cheese and butter making. The Highland Society have given £100 towards each of the various local associations.

We will speak of Kilmarnock as being one of Scotland's sights as a Cheese Fair or show. At Kilmarnock shows, there were prizes given away as follows :—

in 1885	£40
1886	£78
1887	£160

These are prizes given for cheese only. The result is that last year there were 20,000 cheese weighing 1000 tons, and valued at £40,000 to £50,000, so that you can understand how valuable this cheese industry is becoming.

As far as my observation goes, this cheese industry has come about much in the following way. To describe it in a homely fashion : As I said in the early part of this pamphlet, *we* first taught America to make cheese, but now we are not too proud to let America teach *us*. Some years ago Professor Drummond was engaged to come over from Canada as an itinerant instructor in the improved methods of cheese making.

By birth, Mr. Drummond is a Canadian, but his parents were of Ayrshire extraction. He was trained in the Brunsville Company Factory, at Ontario, and as he began, so he continued an instructor. He teaches at an important dairy school on the outskirts of Kilmarnock, which was fitted up a few years ago at a cost of £500, and the annual expenditure is estimated at £800. The farm of Holmes, where the Institute is situated, is a large and excellent one on the estate of Lady Ossington. One complete wing of the build ing has been dedicatedto the purposes of the school, and fitted up with press-room, cheese room, butter room, and milk room. The temperature of the curing room ranges from 66 degrees to 70 degrees F.

Most of you know the good work done by the Worleston Cheese Factory. This Cheshire County Institute was formed to teach better methods of making cheese, to which Governments grants have been given, and they seem already to have done much good. A year or two back they were making nine tons of cheese a year. At that time they were making one pound of cheese from 10½ gallons of milk; the butter was taking 2½ gallons of milk to the pound. The best principles of cheese management will have increased attention as time goes on, which will soon lead to a difference from 5s. to 10s. per cwt. in the quality of cheese, which means a difference of £6 to £7 per cow, which would help wonderfully towards paying

the rent. This institute has given great attention to the early ripening system,

Then comes the late Mr. George Wills' Institute, situated at Tiverton, Devonshire. Mr. Wills was one well known to most interested in dairy work. On entering this dairy institute, one is met with the sights of upwards of 100 cheese, so uniform in size, shape and other characteristics that it is almost impossible to distinguish one from the other. In fact, in tasting you find every cheese so alike that they require no selection. Uniformity was always one of Mr. George Wills' strong points, he always insisted upon pains being taken in feeding of all cows whose milk was sent to this factory, and he ordered that they must all be fed with cake all the year round. Few districts possess more enterprising milk producers than those around this institute. It was Mr. Wills' mother who made the cheese which, at the Royal Show, held at Chester in 1858, won the champion prize of £100. The late Mr. Wills and many others give it as their opinion that cheese making may be followed with success, either in a factory or private dairy, from January to December.

And so I might go on to describe other factories, some being companies, others in private hands. There is a small factory at Jersey, which might be here named (the conditions of which widely differ from any of the above) as my recommendation is that we should make a

choice between the blending house and the factory, where the churning is to be done. This factory is situated at St. Lawrence, and worked by a two-horse engine, driving a Laval separator. It receives about 300 gallons of milk daily, supplied by forty farmers owning from four to fifteen cows a piece. From this quantity the butter yield varies from 150 to 160 pounds, bringing about 1s. 3d. per pound. The milk suppliers receive about 7d. per gallon all the year round. The whole of the separated milk is scalded and sold at 1d. per gallon.

Such as this might be tried in our Yorkshire Dales to advantage, and the time is fast approaching when some such system will be much more general, as everything seems to be moving in that direction.

We have not yet alluded to Wales. The dairy has on the whole been much neglected there; the cheese coming from the same dairy are sadly wanting in uniformity, the butter likewise. The cheese are principally skim, some are mild, while others are sharp or sour. Some light yellow, others of a pinkish hue and freckled. A great deal of this cheese is consumed on the premises, as the out-door labourers and domestic servants are, as a rule, fed there. Perhaps this is the reason so little care is taken in the uniformity of the dairies. Their butter is largely used at home, some of it finding its way into the Midland counties of England.

A cask of Welsh butter not unfrequently contains two or three colours and qualities. The local merchants have frequently condemned the haphazard way in which this butter is made, and have circulated instructions as to the best methods of making, and tried to induce them to depart from the old "rule of thumb" plan, and reform. Their country is suited for good butter making, and some of the very best samples are to be met with mingled with the mottled variety.

The schoolmaster is now abroad. A lecturer on agriculture, of the University College, Aberystwith, has recently been appointed. Mr. D. Parry has during the last few months given practical lessons in butter making in Pembroke and in the South of Cardiganshire, which seem to have been most favourably received.

CHAPTER XIII.

BRITISH DAIRYING.

The British Dairy Farmers' Association, which was established for the improvement of the Dairy husbandry of Great Britain, has done a great work, since it was started in 1876. It is indeed difficult to over estimate the work done by this Association. It has fulfilled its mission up to the present time in a most determined manner, by the improvement of Dairy Stock and Dairy produce, by encouraging the breeding and rearing of stock for the special purpose of the dairy, by a larger and more general production of butter, cheese and eggs, and the invention of new or improved dairy utensils, machinery, implements, and scientific appliances, also by its constant encouragement of conferences in different dairy districts, lectures and discussions, and in every possible way it endeavours to disseminate a more thorough knowledge of dairy husbandry. The steady improvement that is now bursting upon us, which must shortly bring about great and rapid reforms is indeed marvellous. The dairy

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BUTTER STORE & TEST ROOM
WORKING DAIRY
PLATFORM FOR SEPARATORS
MILK RECEIVING AND WEIGHING ROOM (FIRST FLOOR)
RAILWAY CHURN CLEANING ROOM (GROUND FLOOR)
OFFICE
COVERED WAY
COALS
BOILER & ENGINE HOUSE

school and experiment station at Aylesbury, belong to this Association, and has done a good work for several years past.

The annual excursions are times of the greatest interest to both the district and the visitor; papers are read and discussions follow. Among the various districts that have been visited are the South West of Scotland, Eastern Counties of England, Channel Islands, Cumberland, Westmoreland, Ripon, Wensleydale and districts, etc., etc.; inspection being made from farm to farm, to the great benefit of entertainer and guest.

The good work also of the Bath and West of England Society. and Southern Counties Association must not be forgotten; they have done much in the promotion of education in dairying at all their meetings for many years past, and have opened butter schools at Yeovil and Crewkerne; also a cheese school at Vallis farm, near Frome. Recently the Somerset County Council placed the sum of £1,000 at their disposal, for the strengthening of this work and assisting the migratory butter school travelling in Hertfordshire.

The Government Board of Agriculture has during the last year awarded a grant of £350, bearing testimony that it is willing to acknowledge the utility of the Society's work in this direction.

The butter contests, and explanatory lectures and demonstrations given at their yearly meetings

and at other times have done much substantial work. In proof of this, at their last show the total number of entries in the four classes was 145, this number far exceeding that of any previous exhibition since the first competition took place, which I think was in 1879 or thereabouts.

Before that time butter making competitions were quite unheard of. The average temperature of the churn reported at this last show was 55°. This was where four prizes were offered for the best and largest quantity of butter, made in the cleanest and most approved style by students who had attended a course of instruction at any of the Society's butter schools. Fourteen pounds of rather thin cream was given to each of the 29 competitors, and the results were as follows :—average temperature of churn 55°, average weight of butter $3\frac{3}{4}$lbs. The following day was confined to women only, with the same quantity and average temperature, result :—weight of butter 3lbs. $10\frac{1}{2}$oz, and so other trials followed with the uniform average temperature of churn 55°.

As my intention is merely to outline the various movements and powers at work in this reform, we must notice that something is being done to put our butter industry in order. Many other clubs and societies are giving this industry their special attention ; these grants of the County Council, in our immediate district have been most helpful towards the support of the

Travelling Dairy, which has been so ably taken up by the Yorkshire and Durham Colleges, and has done and is doing a good work. Those that have followed it round, and know and have conversed with the pupils, find that many of them acknowledge to have gained much by its instruction.

Enough has now been said to sketch the movements made of late, to improve our butter industry, and it is not for the writer to dictate as to how our future in this direction will be handled, but I have faith to believe, that though we have given the foreigner every opportunity of stamping our dairy out of existence, our nature is such, that if we are determined, we can still do much to win back a portion. We seem now to be moving and willing to move out of the old rut. It will no doubt take some time yet to reach the great want of being able to sell a ton of English butter at a few minutes notice, which we can do at any time with Irish, Danish and other rivals who quote the price in our daily papers by the cwt. The matter for consideration first is for the farmer to put the question to himself—is my farm in this district suited for dairy work, or would some other line of action pay me better?

Take for instance Wensleydale and Swaledale; say in these two dales it is considered that with great effort and pains and following the one line taught by the travelling dairy school, *uniformity*,

would it be best for each to make their own butter as in Normandy and Brittany, after the rule of instruction given them at the above-named school, sending it in the lump, as prepared, just before being made into rolls, to the blending house or houses situated at convenient centres in the Dale? Thus a wholesome rivalry would take place for the top price, the same as in our butter competitions, and all in time would become completely uniform. Some Dales would make one blend of the finest quality, other two or three, according to the districts. Some would become famed far and wide, for perfect butter will always command a good price. Some districts might prefer to co-operate, and convey their milk to the factory to be there dealt with in the way previously described. This would set the farmer and his staff at liberty to give undivided attention to his stock, and time to study the exact cost of his herd per head, and many other points that are of the greatest importance to the careful tender of stock.

In attending Bedale market a short time ago I entered into conversation with the farmers' wives, daughters and dairymaids. I asked the question—would it not be much more simple for you to dispose of your butter in the lump, just out of the churn? They mostly expressed their delight of such a chance, as the present practice often means travelling many miles, ten, twelve, and sometimes fifteen, and if the

market is dull, waiting till late and taking whatever is offered by dealers, who wait for the tired out ones, to drive successful bargains.

This is illustrative of hundreds of others throughout the length and breadth of the land. Now my readers make this your study, put the question to yourselves—what is the best to do with the butter after producing it? How to put it upon the best market in the best possible way, with the least trouble and expense, so as to meet the requirement of the large purchasers? Unless a farmer has an exceedingly large herd, and produces a proportionately large quantity of butter we cannot expect him to be able to make up cwt. casks, boxes or other like packages, as may be thought most suitable to despatch by rail; and even then comes the consideration, would it all be completely uniform?

Therefore, I suggest taking the butter off the farmers' hands directly it is churned, and before it is made up. We could then, by passing it through a butter mixer or blender, produce that evenness which is the great thing needed, and by taking it at this early stage not damage the grain of the butter to the same extent as if made up before being sent to the blender.

The making up into rolls, boxing or casking, also despatching to market, would be legitimate work for a packing house, and would be handling it at the very point where it becomes troublesome to the dairymaid. All this has been done abroad after this fashion, and has

proved the success of their inroads upon our markets. The one great thing needful is an expert at grading the various qualities with accuracy. Get a good man and pay him well for this, because it is vital; no make shift would do for this important post.

Combined action on the part of the producer and distributor would soon place these movements beyond the sneers of those that prefer the old school and, as I said before, we can make the best butter in the world. The spirit of emulation would bring about a system of study to preserve the grain intact. We should then be able to dictate a little to the railways about quicker transit and special rates, with sure prospect of good results if this produce was always circulating.

Several in this district have named to the writer that they are willing to try the experiment of producing factory made butter that shall be equal to any article now placed before us from abroad. I feel sure that with the greatest care bestowed on the superintendence, they would produce a beautiful pale primrose tinted butter that would recommend itself, and would grace the table of any restaurant, or the saloons of any of our large passenger steamers; for the hotel life on board ship is increasing every year. We must remember that we ourselves are the largest consumers of butter in the world using 15lbs. per head per annum, whilst Germany uses 8lbs., Holland 6lbs., France 4lbs., and Italy only 1lb.

CHAPTER XIV.

COST OF BUTTER.

Having been much interested in working out the cost of butter, we will here go into a few details. In watching the movements, and in some cases having taken an active part in the travelling dairy, I interested myself in making out the cost per pound, but this is not fair as it will be quite understood that milk was frequently bought to disadvantage, having to make arrangements to take a certain quantity of milk or cream as the case might be, sometimes to the inconvenience of the seller. I have adopted a fairer plan than this by making an arrangement with a cottage cow-keeper (so called) one who keeps say 3 cows, and whose wife takes the management while he works at some farm; suggesting that they keep an account of the food given daily, which was carried out by giving a mixed diet per day varying it according to circumstances and conditions, but all must be weighed and entered. This was done in several cases most faithfully, and the results were most

interesting, showing plainly that they had been losing for a long space of time as much as ½d. to 1d. per pound, for the want of such information.

In mentioning this matter to several, I have been told it would never answer, it could not be done; but it is known it has been done, and in one case a gentleman deeply interested in dairy work lent his herd of cattle to the British Dairy Farmers' Association. At the time of doing so they were costing him 10/7 per head weekly, and after a few months' experiment that amount was reduced to 6/8; this was without diminishing the quality or quantity of milk, and in all other ways they were in quite as good a condition with this 4/- reduction per head. This experiment alone proves economy in feeding is well worth a study, and to know the exact cost is most important.

In America they have given much attention to this department. The lectures delivered some time ago, under the auspices of the American Agricultural Department, by Dr. Armsby one of the greatest authorities in Germany, upon the feeding of live stock, have done much good, shewing the farmer not only how to use what he grows, but how to use with advantage any foods which he can buy. All these experiments add great interest to the profession and mean in many cases increased profit, if all these matters were as closely ob-

served here as they are now in New Zealand, with the result that butter, that was not yielding them a profit a few years ago, now leaves a fair margin. I think in the above case thanks are due to the factory system, for we are told the agent of an English firm has made an offer of 10d. per pound for the whole of next summer's production, from the factory named in the early part of this pamphlet ; they being able to procure 1/- per lb. in the winter months, and we are told that previous to the establishment of this factory the average price did not exceed 7d. per lb. This shows very clearly the benefit of the factory system in New Zealand.

It does indeed seem strange that such a concern, in a country where land is dear and labour high (for farmers' supplying this dairy stand at 25/- per acre rent, and they have to find a market 13,000 miles away), should flourish, while in England, with a good market at our doors, we complain.

It also seems strange that what few factories we have tried in this country do not seem to have succeeded. Very true ; but there are some that flourish while others have collapsed. This should not make us despair of their ultimate success. The rapid strides now taking place and the opportunities offered us for posting ourselves up in the latest movements of the English dairy, will soon place us in a position to see clearly the best methods to adopt.

CHAPTER XV.

TRAVELLING DAIRY.

Some ask: Is the Travelling Dairy School, which is becoming so general all throughout the country, doing good in proportion to the outlay? We should say decidedly it is. The first principle that it teaches is *uniformity*. Before any of us can be brought to see that he or she can derive any benefit from education, he or she must first of all be convinced that they have something to learn. Until we begin to realise our own ignorance, we are inclined to be sceptical as to the superior wisdom of others. Even when we have got so far as to acknowledge the existence of that superiority, we find it difficult to estimate its value. As it is with individuals, so it is with humanity at large, and shows itself also among the rapidly growing class directly interested in the butter making industry.

These travelling dairies, I trust, will go on doing good work and extend more to cheese making, for we must remember that this instruction is very much needed. It being a much longer process, requires a much longer time to learn.

Butter making may be mastered pretty thoroughly in a month or six weeks; but cheese making, such as Cheddar, Cheshire, Stilton, and the like, will take twelve months to master. I don't mean to cram up the theoretical part in a few weeks, relying wholly on theory, not having the slightest practical knowledge of cheese making.

You cannot tell in the curd, you cannot ascertain until it is ready what a cheese will be like, and it may not be ready for a whole year, because of the varying temperature and seasons in the year makes such a difference in cheese making.

You may see at once what butter is as soon as it is made, you call tell if good or bad. Within a week or so you can test its keeping properties, but it is not so with cheese. Good cheese makers are far from numerous. There is much need for increasing their number. Cheese making is an art, one that, unless incessant care and observation is exercised, is quite impossible to procure good results.

When this instruction is more fully taken up by the travelling dairy it would be better done by visits paid to the various farms where the farmer is willing to take them in. This would lead to the discovery that few farm-houses in the country have accommodation for cheese making. Farmers now have to make and store their cheese under considerable disadvantages.

Great reforms, I trust will soon be brought about in this direction. Cheese is often spoilt before the rennet is added to the milk; the damage resulting from want of proper accommodation to keep milk in a proper state over night, which would be one of the first things a pupil would be taught, *i.e.*, the early stage in which damage may be done.

Cheese making is the most troublesome kind of dairying that we have, and, I should say, will, to be successful, be conducted more on factory system. Let every village, town and hamlet meet in conference on these matters frequently, and have them well thrashed out.

SOUTH KENSINGTON

PROGRESSIVE QUESTIONS

IN THE

ELEMENTARY AND ADVANCED STAGES

OF THE

PRINCIPLES OF AGRICULTURE.

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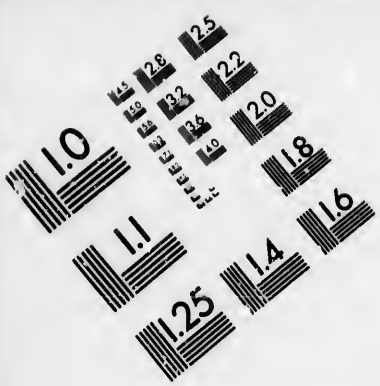

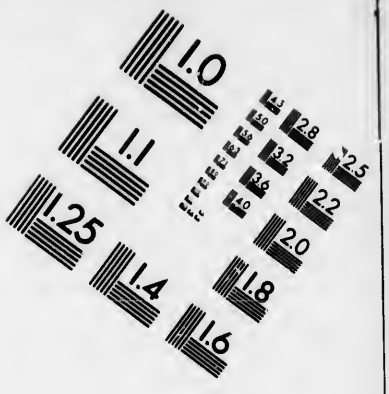

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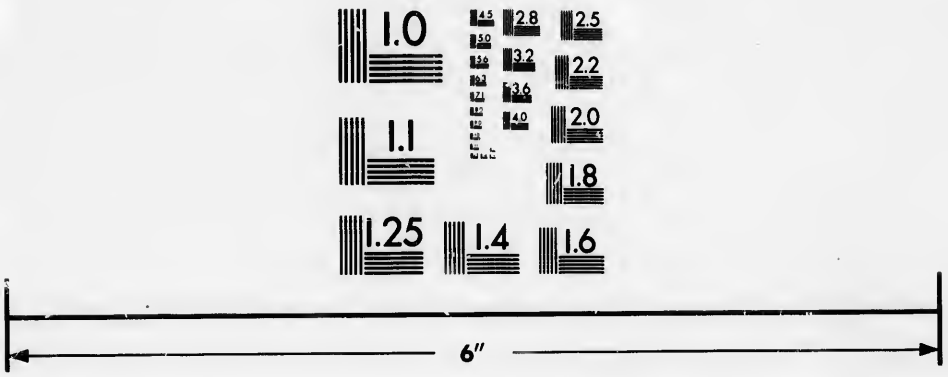

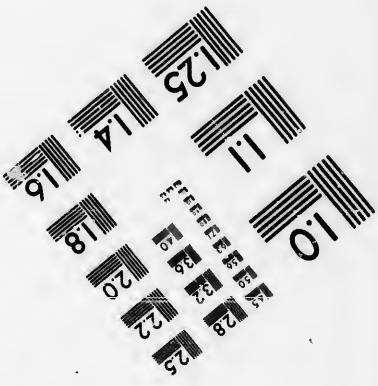

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